



**Technical Memorandum
Comments on the Draft Remedial Investigation Report**

**Gulfc0 Marine Maintenance Company
Freeport, Brazoria County, Texas
EPA Identification No. TXD055144539**

**Remedial Action Contract 2 Full Service
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Prepared for

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1.0 INTRODUCTION

This Technical Memorandum summarizes EA Engineering, Science, and Technology, Inc.'s technical review comments for the Draft Remedial Investigation (RI) Report, dated 4 February 2011, and prepared by Pastor, Behling & Wheeler, LLC (PBW) for the Gulfco Marine Maintenance Superfund Site (site), located in Freeport, Texas. The technical review was conducted to assure that the Draft RI Report provides information regarding nature and extent of contamination, and supports the Screening Level Ecological Risk Assessment (SLERA), Baseline Ecological Risk Assessment (BERA), and Baseline Human Health Risk Assessment (BHHRA) prepared for the site.

General technical review comments pertaining to the Draft RI Report are provided in Section 2.0. Specific technical review comments are provided in Section 3.0. Section 4.0 provides a summary based on the outcome of the technical review.

2.0 GENERAL TECHNICAL REVIEW COMMENTS

In general, the RI report is complete and provides sufficient data to define nature and extent of contamination to support risk assessment and remedy selection. There are some general issues noted below that should be considered in evaluating pathway analysis and screening remedial alternatives. These include:

General Comment 1

Dense non-aqueous phase liquid (DNAPL) is present at the site in both Zone A and Zone B ground water, near the southwest corner of the former surface impoundment.

General Comment 2

The ground water is Class 3, in accordance with the Texas Risk Reduction Program (TRRP), which provides substantial screening level relief. However, solute concentrations emanating from the DNAPL source areas are still substantially in excess of screening levels (more than 100 times for TCE).

General Comment 3

Insufficient monitoring wells exist to establish the nature of solute plume(s) emanating from the DNAPL. The nearest well(s) to the DNAPL in down gradient directions are not significantly impacted, but are potentially decades and/or centuries of travel time down gradient of the DNAPL source. Demonstration of plume stability, if a necessary component of remedy, will require monitoring wells that sample the solute plume(s).

General Comment 4

The total dissolved solids (TDS) concentrations at the site are very high, which renders the ground water non-potable. However, variability of TDS between wells is not shown, and the spatial effect that TDS and density may play in evaluation of water levels is not evaluated. Water levels may need to be corrected for density effects depending on variability in TDS in order to accurately depict ground water flow directions. If fluid density is uniform throughout the site, density effects are likely negligible.

General Comment 5

Source area monitor wells in which DNAPL was observed during construction have very high levels of TCE and PCE. The direction of groundwater flow from the source area in Zone A is not clear based on the potentiometric surface (Figure 32) and in Zone B (Figure 37). The source area appears on a divide, with flow to the north and south from this area. As indicated in General Comment 4, it does not appear that water levels have been adjusted for density effects (which may or may not affect the potentiometric surface). An insufficient monitoring network also exists around the DNAPL source to evaluate solute transport or trends.

- a. The direction of groundwater flow in Zone B is from NE3MW30B (where DNAPL is present) toward the north. The nearest down gradient well to the north in Zone B is OMW27B. The distance between these wells is 800 feet. The reported seepage velocity in Zone B (p. 54) is 0.8 ft/yr. This places the down gradient monitoring well 1,000 years (slug flow) down gradient. And this allows for no retardation. Therefore, the location of OMW27B is not sufficient for performance assessment in the long term. For example, a very substantial plume could grow, albeit at a low rate, with no means of verifying plume stability or lack thereof.
- b. In Zone A ground water, the trends for chlorinated ethenes (cis 1,2-DCE, TCE, and PCE) are increasing in a down gradient direction at ND3MW29 and ND3MW02, indicating the Zone A solute plume may not be stable. These wells are known to be completed in DNAPL, however, which complicates the analysis of stability. Monitor well ND4MW03 remains relatively uncontaminated, and provides a sentinel well roughly 200 feet down gradient of ND3MW02. The estimated seepage velocity in Zone A ground water is 5 ft/year, and given a release date of 27 to 38 years ago, and reasonable retardation of 3 to 5, contamination, if mobile, may still have not reached this point. Therefore, ND3MW02 may be too far down gradient of the DNAPL source to provide performance monitoring.

General Comment 6

The summary for the BHHRA neglects to clarify some essential aspects of the BHHRA. As such, it is not sufficient to cover the results of the BHHRA. Specific comments have been provided, which address the deficiencies of the BHHRA summary, as presented in the text.

General Comment 7

The BHHRA conclusions were based to some extent on deed restrictions to limit exposure to the site. However, deed restrictions are not mentioned in the Draft RI. The assumptions regarding deed restrictions in the BHHRA should also be reflected in the Draft RI in the Executive Summary, Summary of BHHRA and Conclusions.

3.0 SPECIFIC TECHNICAL REVIEW COMMENTS

The following specific comments are provided regarding the RI report.

1. Executive Summary, Pages 2 through 4

The executive summary details the media evaluated for the site but does not discuss the analysis of the fish that was conducted. A summary of the fish ingestion pathway analysis should be included in the Draft RI summary as a medium of concern that was investigated for the site.

2. Executive Summary, Page 6

The executive summary should include a discussion of deed restrictions per the assumptions of the BHHRA.

3. Section 4.6.1, Page 74; Section 4.6.2, Page 76, and Section 8.0, Page 99

DNAPL is present, although its significance is not developed. NAPL is not discussed in the conclusions (p. 99), nor in nature and extent of contamination, Sections 4.6.1 (p. 74) or 4.6.2 (p.76). DNAPL dissolution is mentioned as a “possible mechanism by which groundwater may impacted” in fate and transport Section 5.3.3 (p. 84). DNAPL is not a “possible mechanism,” rather it is the predominant issue regarding sourcing of chemicals of interest (COIs) to ground water pathways.

- a. As shown on Figures 72 and 73, TCE and PCE contaminant concentrations at ND3MW02 in Zone A and NE3MW30B in Zone B are indicative of DNAPL. For example, PCE in ND3MW02 was 35 mg/L in June 2008, which is more than 20 percent solubility. The nearby Zone B concentration in NE3MW30B is 24 mg/L, or about 15 percent solubility. For TCE, the respective concentrations and

percent of solubility in Zone A and Zone B are 76 mg/L, 6 percent and 170 mg/L, 13 percent.

a. Inspection of boring logs (Appendix C) indicates DNAPL:

- i. ND2MW01 – “(15.0 to 17.0) ... brown staining along fractures, chemical odor”
- ii. ND3MW02 – “(14.6 to 21.1) ... visible NAPL at 21.0”
- iii. ND3MW29 – “(12.5 to 16.6) ... NAPL (sheen) visible within sand from 15 to 16.4 feet.”
- iv. ND3PZ04 – “(6.5 to 17.0) ... odor” and PID elevated between 121 and 304 over entire interval.
- v. NE3MW30B – “29.5-34.1 ... NAPL visible within sand from 33.9 to 34.1”

b. Observations of DNAPL were at the base of the respective sand bodies, and indicate DNAPL as expected based on the COI (PCE and TCE). In Zone A, DNAPL is directly observed or indicated in borehole logs at ND2MW01, ND3MW2, and ND3MW29. At ND3PZ04 elevated PID readings and odor indicates the western margin of DNAPL, and at NE3MW05, a sheen but low solute concentrations and low field PID indicate eastern margin of DNAPL. The source zone dimension in a north-south sense may exceed 200 feet.

c. The boring log, as well as solute concentrations, for NE3MW30B indicates DNAPL in Zone B.

d. There is no indication, either direct or implicit, of DNAPL in Zone C.

4. Section 6.0, Page 92, Paragraph 3.

The summary indicates that the BHHRA follows USEPA risk assessment guidance. The use of background values for screening and the statistical methods employed in the BHHRA were approved by USEPA Region 6 for this site, but deviate from standard guidance documents. This should be stated in the text to clarify that standard USEPA guidance was not employed throughout. References for the conversations with USEPA Region 6 regarding these deviations should be provided.

5. Section 6.0, Page 92, Paragraph 4

The text should clarify how the background was determined for the site. For example, enough information should be provided to ensure that the chosen background for the site provides an adequate representation of actual background for the area (e.g., where it was

collected offsite, if the background data was validated). A reference for the background data should be provided.

6. Section 6.0, Pages 92 through 94

Much of the conclusions of the BHHRA were based on the limitations of human contact through deed restrictions. This should be presented thoroughly in the RI BHHRA summary.

7. Section 6.0, Pages 92 through 94

The summary of the BHHRA includes a synopsis of the exposure assessment, toxicity assessment and risk characterization but does not include a conclusion section. A conclusion section should be added for clarification.

8. Section 7.0, Page 95

The summary for the Ecological Risk Assessments is general and could provide more detail. An example is presented starting on line four, second paragraph, which states: *"This conclusion was based on exceedances of protective ecological benchmarks in soil, sediment, and surface water for direct toxicity as described in the SLERA."* This statement could have provided greater detail relating to what specific receptors, and what Constituents of Potential Concern (COPC) were identified. Another example is located in the second paragraph of page 96, which states, *"Samples from Site and reference locations showed varying degrees of toxicity, but comparing toxicity results with analytical data did not indicate a consistent pattern or trend between samples or test species."* This statement does not indicate the number of samples or the specific toxicity/analytical data results being compared, which makes it difficult for the reader to determine what is being stated.

9. Section 7.0, Page 96, Second Paragraph

Line three of the second paragraph states *"A subsequent multivariate analysis that considered both chemical analytical data and physical parameters (e.g., grain size) concluded that there was not a single factor contributing to the observed toxicity in the sediment samples."* Due to submittal of the Draft RI Report prior to the draft BERA submittal, the latter of which contains this data, this statement could not be evaluated for accuracy.

10. Section 7.0, Page 96, Second Paragraph

Line five of the second paragraph states *"A statistical evaluation of the toxicity data determined that there was no statistically significant difference in the toxicity observed in samples collected at the reference locations and the Site for sediment/soil exposure..."* While this is a true statement, only the two sediment reference locations were utilized,

which may have reduced the statistical power of this evaluation due to the limited number of samples used to perform it. Pooling of the three reference soil samples with the two reference sediment samples may have provided different conclusions for this evaluation.

11. Section 7.0, Page 96, Second Paragraph

Results of the surface water toxicity test are over-simplified. Line seven of the second paragraph states “...*there was no toxicity associated with the surface water locations.*”, when in fact, surface water sample EWSW-03 did exhibit toxicity to *Artemia* of 31% and 11% , at 24 and 48 hours, respectively. In addition, there was no acknowledgement of the surface water toxicity test issues, which included control failure for all 96 hour results, with subsequent rejection of all 96 hour data. In addition, the *Artemia* test had to be performed on three separate occasions, with one set of test data having to be rejected due to a feeding error, and rejection of the other data set due to control failures for all of the test times.

12. Section 7.0, Page 96, Second Paragraph

Line nine of the second paragraph states “...*no further ecological studies or ecologically-driven response actions are proposed.*” While other specific comments have been provided relating to the presentation of toxicity test results and interpretations to be used for completion of the BERA, the reviewer is in agreement that this is an appropriate action for the site.

13. Section 8, Page 97

Impacts to sediment and soil refer to “certain PAHs.” For clarity and emphasis, it would be appropriate to identify the PAHs detected as “carcinogenic PAHs” for human health pathways where this is the case.

14. Section 8.0, Page 100, First Paragraph

PBW concludes “...*the primary ground water COI plume areas exhibit generally stable or declining trends.*” This has not been demonstrated in the area of DNAPL (e.g., southwest corner of former surface impoundment). The PCE and TCE trends shown on Figures 72 and 73 are significantly increasing at ND3MW02 from 2006 to 2008, which does not support this statement. Nonetheless, ND3MW02 is completed in DNAPL, so a declining trend is unlikely under ambient conditions. Unfortunately, insufficient monitoring network exists to evaluate solute concentrations and trends emanating from the DNAPL.

15. Section 8.0, Page 100, First Paragraph

PBW cites evidence of COI degradation, which to some degree may be occurring. However, given the nature of past discharges to the surface impoundment of varying barge contents and cleaning waste streams, it may be difficult to separate degradation

products from principal discharged wastes. Current solute concentrations in the source area render the natural process of attenuation marginal with respect to contaminant mass reduction.

16. Section 8.0, Pages 97 through 101

The conclusions should include a discussion of deed restrictions per the assumptions of the BHHRA.

4.0 SUMMARY

In summary, the Draft RI Report is complete and the nature and extent of contamination sufficiently delineated to support risk assessment and remedy selection. Depending on the remedy selected, additional ground water monitoring wells may be necessary to evaluate plume stability. Well spacing relative to travel time stated in the Draft RI report is too great to evaluate concentration trends and reductive dechlorination in the solute plumes. Although some data exist that suggest reductive dechlorination is occurring, insufficient data exist to evaluate this hypothesis fully.

Concentration trends in source area wells are increasing significantly and down gradient monitoring wells are too far away from the source area based on seepage velocities to monitor solute trends. Therefore, based on existing data, it is not possible to establish any meaningful conclusion regarding plume stability and degradation processes at work. This issue may require additional ground water study depending on the remedy selected.

REFERENCES

Pastor, Behling & Wheeler. 2011. Draft Remedial Investigation Report for the Gulfco Marine Maintenance Superfund Site, Freeport, Texas. February 4.